Preparation of complex hydrogels composed of chitosan, sodium triplyphosphate and κ-carrageenan as xanthone encapsulating material

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Abstract: Xanthone is a bioactive compound extracted from the peel of Garcinia mangostana fruit (or mangosteen). However, its antioxidant and antibacterial properties could suffer rapid deterioration when exposed to strong light and atmospheric oxygen. The objective of this study is to obtain complex hydrogels composed of chitosan, sodium tripolyphosphate (TPP) and κ-carrageenan as encapsulation material in order to promote long-term stability of xanthone, thereby expecting to make it effective for topical treatment of skin problems such as acne. Observations were conducted on various formulations of complex hydrogels composed of chitosan (0.4 and 1%), TPP (0.1 and 0.2%), κ-carrageenan (0.2, 0.5 and 1%), and xanthone extract (0.3 and 0.5 %) with the ratio of the hydrogel to xanthone being kept at 7:1 and 9:1, in order to select the formulation that yields the highest stability of xanthone at 4°C and 25°C. The microstructural morphology of the selected complex hydrogel was observed with a scanning electron microscope (SEM) and the stability of the encapsulated xanthone was investigated and compared with the case of free xanthone. A summary of the observed formulations, including the most suitable one, will be presented. Investigation of its effectiveness for topical treatment of skin problems will be carried out in subsequent work.

Keywords: Xanthone; Chitosan; κ-carrageenan; Sodium tripolyphosphate; Hydrogel